

IN THE CLAIMS

1. (Previously Presented) A scanning circuit for a document scanner, comprising: a main circuit module capable of receiving a scanning instruction from a communication interface, converting the scanning instruction into scan control signals, passing the scan control signals to a connection cable as well as receiving a digital image data captured in a document scanning operation through the connection cable; and

an optical sensor circuit module connected to the main circuit module through the connection cable capable of receiving the scan control signals and converting the scan control signals to timing control signals that control document scanning, extraction of an analog image signal from the document and conversion of the analog image signal into the digital image data.

2. (Previously Presented) The scanning circuit of claim 1, wherein the main circuit module further includes: a main control logic unit capable of receiving the scanning instruction and converting the scanning instruction into scan control signals and receiving digital image data; a memory unit capable of holding the digital image data and a memory control logic unit coupled to the main control logic unit and the memory unit capable of controlling the access of digital image data.

3. (Previously Presented) The scanning circuit of claim 2, wherein the main control logic unit further includes an image preprocessor capable of compensating and adjusting the digital image data.

4. (Previously Presented) The scanning circuit of claim 2, wherein the memory comprises a dynamic random access memory.

5. (Previously Presented) The scanning circuit of claim 1, wherein the optical sensor circuit module further includes: an optical sensor capable of detecting and producing the analog image signal; an analog front-end processor coupled to the optical sensor capable of preprocessing the analog image signal; an analog/digital converter coupled to the analog front-end processor capable of converting the pre-processed analog image signal into the digital image data; and a timing generator coupled to the optical sensor and the analog/digital converter capable of generating the timing control signals that control a generation of the

analog image signal and a conversion of the analog image signal into the digital image data.

6. (Original) The scanning circuit of claim 5, wherein the optical sensor includes a charge-coupled device.

7. (Original) The scanning circuit of claim 5, wherein the optical sensor includes a complementary metal-oxide-semiconductor (CMOS) image sensor.

8. (Original) The scanning circuit of claim 1, wherein the connection cable includes a flat cable.

9. (Original) The scanning circuit of claim 1, wherein the communication interface includes a universal serial bus interface.

10. (Previously Presented) The scanning circuit of claim 1, wherein the scan control signals are capable of being transmitted through an integrated circuit (IC) communication interface.

11. (Previously Presented) A scanning method, comprising:
receiving scan control signals at an optical sensor circuit module via a connection cable;
and
converting the scan control signals to timing control signals to control document scanning.

12. (Previously Presented) The method of claim 11, further comprising:
receiving a scanning instruction from a communication interface via a main circuit module;
converting the scanning instruction into scan control signals; and
passing the scan control signals to the connection cable.

13. (Previously Presented) The method of claim 12, further comprising:
extracting an analog image signal captured in a document scanning operation from a document at said optical sensor circuit module;

converting the analog image signal into a digital image data at said optical sensor circuit module; and

receiving the digital image data at said main circuit module through the connection cable.

14. (Previously Presented) The method of claim 13, further comprising:
receiving the scanning instruction and converting the scanning instruction into scan control signals and receiving digital image data at the main circuit module via a main control logic unit;

holding the digital image data at the main circuit module via a memory unit; and
controlling the access of digital image data at the main circuit module via a memory control logic unit coupled to the main control logic unit and the memory unit.

15. (Previously Presented) The method of claim 14, further comprising
compensating and adjusting the digital image data at the main control logic unit via an image preprocessor.

16. (Previously Presented) The method of claim 13, further comprising:
detecting and producing the analog image signal at the optical sensor circuit module via an optical sensor;

preprocessing the analog image signal at the optical sensor circuit module via an analog front-end processor coupled to the optical sensor;

converting the pre-processed analog image signal into the digital image data at the optical sensor circuit module via an analog/digital converter coupled to the analog front-end processor; and

generating the timing control signals that control a generation of the analog image signal and a conversion of the analog image signal into the digital image data at the optical sensor circuit module via a timing generator coupled to the optical sensor and the analog/digital converter.

17. (Currently Amended) A scanning method, comprising:
extracting an analog image signal captured in a document scanning operation from a document at an optical sensor circuit module including an optical sensor;

converting the analog image signal into a digital image data at said optical sensor circuit module;

receiving the digital image data from said optical sensor circuit module at a main circuit module through a connection cable; and

generating timing control signals that control a generation of the analog image signal and a conversion of the analog image signal into the digital image data at the optical sensor circuit module via a timing generator coupled to ~~an~~ the optical sensor and an analog/digital converter.

18. (Previously Presented) The method of claim 17, further comprising:
holding the digital image data at the main circuit module via a memory unit; and
controlling the access of digital image data at the main circuit module via a memory control logic unit coupled to a main control logic unit and the memory unit.

19. (Previously Presented) The method of claim 18, further comprising
compensating and adjusting the digital image data at the main control logic unit via an image preprocessor.

20. (Previously Presented) The method of claim 17, further comprising:
detecting and producing the analog image signal at the optical sensor circuit module via an optical sensor;
preprocessing the analog image signal at the optical sensor circuit module via an analog front-end processor coupled to the optical sensor; and
converting the pre-processed analog image signal into the digital image data at the optical sensor circuit module via an analog/digital converter coupled to the analog front-end processor.

21. (Previously Presented) A scanning apparatus, comprising:
means for extracting an analog image signal captured in a document scanning operation from a document at an optical sensor circuit module;
means for converting the analog image signal into a digital image data at said optical sensor circuit module;
means for receiving the digital image data from said optical sensor circuit module at a main circuit module through a connection cable; and

means for generating timing control signals that control a generation of the analog image signal and a conversion of the analog image signal into the digital image data at the optical sensor circuit module.

22. (Previously Presented) The apparatus of claim 21, further comprising:
means for receiving a scanning instruction from a communication interface at said main circuit module;
means for converting the scanning instruction into scan control signals;
means for passing the scan control signals to said connection cable;
means for receiving the scan control signals at said optical sensor circuit module via the connection cable; and
means for converting the scan control signals to timing control signals to control document scanning.

23. (Previously Presented) The apparatus of claim 22, further comprising:
means for holding the digital image data at the main circuit module; and means for controlling the access of digital image data at the main circuit module.

24. (Previously Presented) The apparatus of claim 21, further comprising means for compensating and adjusting the digital image data at the main circuit module.

25. (Previously Presented) The apparatus of claim 21, further comprising:
means for preprocessing the analog image signal at the optical sensor circuit module;
and
means for converting the pre-processed analog image signal into the digital image data at the optical sensor circuit module.

26. (Previously Presented) A scanner, comprising:
a scanning module, the scanning module including a main circuit module and an optical sensor circuit module;
the main circuit module capable of receiving a scanning instruction from a communication interface, converting the scanning instruction into scan control signals, passing the scan control signals to a connection cable as well as receiving a digital image data captured in a document scanning operation through the connection cable; and

the optical sensor circuit module connected to the main circuit module through the connection cable capable of receiving the scan control signals and converting the scan control signals to timing control signals that control document scanning, extraction of an analog image signal from the document and conversion of the analog image signal into the digital image data.

27. (Previously Presented) The scanner of claim 26, wherein the main circuit module further includes: a main control logic unit capable of receiving the scanning instruction and converting the scanning instruction into scan control signals and receiving digital image data; a memory unit capable of holding the digital image data; and a memory control logic unit coupled to the main control logic unit and the memory unit capable of controlling the access of digital image data.

28. (Previously Presented) The scanner of claim 27, wherein the main control logic unit further includes an image preprocessor capable of compensating and adjusting the digital image data.

29. (Previously Presented) The scanner of claim 26, wherein the optical sensor circuit module further includes: an optical sensor capable of detecting and producing the analog image signal; an analog front-end processor coupled to the optical sensor capable of preprocessing the analog image signal; an analog/digital converter coupled to the analog front-end processor capable of converting the pre-processed analog image signal into the digital image data; and a timing generator coupled to the optical sensor and the analog/digital converter capable of generating the timing control signals that control a generation of the analog image signal and a conversion of the analog image signal into the digital image data.

30. (Previously Presented) An apparatus, comprising:
an optical sensor circuit module capable of being connected to a main circuit module through a connection cable,
wherein the optical sensor circuit module is capable of receiving scan control signals from the main circuit module and converting the scan control signals to timing control signals that control document scanning, and
wherein the optical sensor circuit module is capable of extraction of an analog image signal from the document and conversion of the analog image signal into digital image data.

31. (Previously Presented) The apparatus of claim 30, wherein the optical sensor circuit module further includes: an optical sensor capable of detecting and producing the analog image signal; an analog front-end processor coupled to the optical sensor capable of preprocessing the analog image signal; an analog/digital converter coupled to the analog front-end processor capable of converting the pre-processed analog image signal into the digital image data; and a timing generator coupled to the optical sensor and the analog/digital converter capable of generating the timing control signals that control a generation of the analog image signal and a conversion of the analog image signal into the digital image data.